

Nebraska Information Technology Commission Strategic Initiatives

Strategic Plan for the Statewide Synchronous Video Network

Objective

The objective of this initiative is to achieve a statewide synchronous video network capable of enhancing educational opportunities and citizen services through the exchange of interactive video between and among various sectors.

In order to accomplish this, a number of tasks must be completed.

- Identification of a single audio and video standard for low-bandwidth distance learning and videoconferencing;
- Acquisition of upgrade or replacement equipment and/or software that ensures compliance with the audio and video standard;
- Development or purchase of a scheduling system or enterprise resource management program that allows potential users to A) know the location and availability of resources, and B) set up or reserve ad hoc or regularly scheduled events with other entities;
- Development of a network bandwidth management system or network operations center that assures pre-determined qualities of service, depending upon the type of video traffic;
- Development of an event clearinghouse that allows promotion, marketing, and registration for interactive video events;
- Development of training modules for new users;
- Development of a cost and funding algorithm to allow shared use of the statewide backbone for interstate distance education and videoconferencing.

Benefits

Since 1992, various entities within the State of Nebraska have spent an estimated 20 million dollars on interactive video capture and display equipment, fiber connectivity, and engineering design charges to provide for distance learning and videoconferencing. Considered cutting edge technology in the early years of operation, this investment resulted in over 300 high-quality, videoconferencing classrooms using multiple, incompatible video protocols spread over numerous separate political subdivisions. These service regions were established when groups partnered together to set up

interlocal agreements in order to receive grant funds, enter into contracts and hire staff to exchange high school and college classes. Other smaller videoconferencing networks were set up by other state agencies and hospitals but were not interoperable with the school and college sites.

In order for Nebraska to maximize the potential of its investment in interactive videoconferencing and to create unprecedented educational opportunities, all videoconferencing sites in this State must be in compliance with the State video compression standard and stakeholders must agree to work collaboratively to enhance the benefit for all end users.

Current Status

Currently, Nebraska enjoys one of the most robust collections of local connectivity and bandwidth among any of its rural neighbors. This equates to 192 DS-3 (45 megabit per second, JPEG and MPEG2 video) circuits to high schools served by telephone companies and 112 high school sites that are served by cable companies with 100 megabit per second, full duplex, fiber circuits with H.263 video. Only about 10 high schools are left in rural areas of the State without high bandwidth connections, many at their own choosing. Other state agency and telehealth videoconferencing circuits consist of single or double dedicated T-1 (1.55 megabit per second) lines.

Nebraska high school distance learning classrooms are some of the busiest in the country, with each classroom being used about 50% of the school day across the entire system. Taking high school credit courses and higher education dual credit and college credit courses at a distance, students are able to fulfill graduation requirements and expand their high school experiences with opportunities that are unavailable at their local high school. Some high schools permit community and adult education classes in the evening hours.

Distance learning consortia (interlocal agreements between neighboring districts) often are able to share the talents of one qualified instructor across several schools and sections of students each semester.

Unfortunately, due to the high costs of transporting high bandwidth (JPEG) video signals, distance learning consortia have been unable to afford course exchange with consortia in other parts of the State, thus limiting their credit course offerings and educational opportunities.

The original 10-year contracts between the distance learning consortia and the telephone company providers for JPEG video service will begin expiring in the Spring of 2006. With no chance of contract extensions for JPEG video service, the schools will need to upgrade to an H.323 Internet Protocol communication standard, new codecs (Coder-Decoders) to accommodate the H.263/H.264 video standards, and switch/router technology at the school site to manage the resulting data network. The later of the JPEG consortium contracts are not due to expire until 2009 but the industry has chosen to no longer manufacture nor repair JPEG video equipment, thus prompting an early conversion of these contracts to IP video.

Whereas Nebraska's (telco provided) interactive video efforts have been mostly localized with high bandwidth video, most other States have converted or are converting to IP video and have been trying to realize further educational programming through ad hoc enrichment activities and use of Internet2.

The current network will not be able to meet the future distance learning applications and the bandwidth needs for the Internet and Internet2. Therefore it is necessary to convert to the next generation distance learning (data) network.

Future

Nebraska has enormous potential to assemble one of the country's best telecommunications networks for education, health care, and government. The Nebraska Information Technology Commission and its advisory groups have fostered a collaborative environment for participative decision making among several major subsectors. The Collaborative Aggregation Partnership, a team of University of Nebraska, Division of Communications, and Nebraska Educational Telecommunications staff have been successful in negotiating statewide backbone contracts for scalable bandwidth for public entities. Technological developments and breakthroughs in routing technology in the past two years have greatly enhanced the quality of service related to IP-based, H.26X video compression.

The new Statewide Synchronous Video Network design incorporates the requirements established by the Statewide Synchronous Video Network Work Group of the Nebraska Information Technology Commission. This network design has the flexibility to support both proprietary and standard protocols, and allows the school full access to the available bandwidth. The network can grow to meet any bandwidth or application requirements, and has any optical interface available from Ethernet to OC192.

This network design is consistent with the goals of the Nebraska Information Technology Commission and will integrate into Network Nebraska. Most importantly for those who qualify, this network is eligible for E-rate discounts. All consortiums and member schools benefit because this is a plan toward statewide services and interconnectivity. Not only is video bandwidth available, but also data applications such as the Internet and Internet2. Asynchronous distance learning applications such as Blackboard, WebCT or Angel become a reality with the bandwidth that will be made available, and multiple classrooms become much more affordable.

The contracts for the current distance learning networks begin to expire in the next two years. This network is leading edge technology, is of carrier grade quality, and is scalable to meet any growth demands.

The vision of the future statewide synchronous video network includes the umbrella capacity for any interactive video unit to be able to interconnect with any other interactive video unit, regardless of location. The vision of the future also includes assurances for network security and quality of service within a particular sub-network (i.e. telehealth, State Patrol, K-12 distance learning). Most end users are in agreement that the State should purchase or contract for a single software scheduling system that can remotely

turn on a specific video unit, log system usage statistics, allow promotion of ad hoc education events, and secure permission for usage from local site coordinators.

Recommended Actions

(NOTE: These recommendations are still subject to change, pending additional advice from those entities that are participating in this strategic initiative.)

A. Identification of a single audio and video standard for low-bandwidth distance learning and videoconferencing.

Actions include:

1. Approval of the H.263/H.264 video compression protocol and G.722, G.722.1, and G.728 audio compression protocols by the Nebraska Information Technology Commission.
 - a. Lead Entity: NITC Technical Panel
 - b. Timeframe: September 9, 2004
 - c. Funding: No funding required for this task

B. Acquisition of upgrade or replacement equipment and/or software that ensures compliance with the audio and video standard.

Actions include:

1. Development and submission of a Congressional funding request to fund upgrade of classroom and networking resources necessary to bring K-12 and higher education distance learning facilities into compliance.
 - a. Lead Entity: NITC Technical Panel's Statewide Synchronous Video Work Group
 - b. Timeframe: September 3, 2004
 - c. Funding: Actual request estimated at \$13 million; no funding required to develop the request.
2. Designation of a fiscal entity to oversee bidding, ordering, delivery and installation of equipment.
 - a. Lead Entity: To be named.
 - b. Timeframe: March, 2005
 - c. Funding: No funding required for this task.
3. Equipment RFP, bidding, ordering, delivery and installation of equipment
 - a. Lead Entity: To be named
 - b. Timeframe: August 2005-July 2006
 - c. Funding: Funding to oversee this task included in Congressional request.

C. Development or purchase of a scheduling system or enterprise resource management program that allows potential users to know the

location and availability of resources, and/or set up or reserve ad hoc or regularly scheduled events with other entities.

Actions include:

1. Research scheduling systems and enterprise resource management programs.
 - a. Lead Agency: NITC Technical Panel's Statewide Synchronous Video Work Group
 - b. Timeframe: September 2004-December 2004
 - c. Funding: No funding required for this task.
2. Purchase or develop a scheduling system and/or enterprise resource management program.
 - a. Lead Entity: To be named.
 - b. Timeframe: Summer, 2005
 - c. Funding: Funding to complete this task included in Congressional request.

D. Development of a network bandwidth management system or network operations center that assures pre-determined qualities of service, depending upon the type of video traffic.

Actions include:

1. Implementation of a network operations center that assures particular qualities of service.
 - a. Lead Entity: Network Nebraska (Collaborative Aggregation Partnership)
 - b. Timeframe: Ongoing
 - c. Funding: Funding to complete this task will likely be derived from Network Nebraska overhead charges.

E. Development of an event clearinghouse that allows promotion, marketing, and registration for interactive video events.

Actions include:

1. Development of a web-based clearinghouse that allows originators to post events and users to register for or view the date, time and frequency of individual events.
 - a. Lead Entity: To be named.
 - b. Timeframe: Fall, 2006
 - c. Funding: To be determined.

F. Development of training modules for new users.

Actions include:

1. Development of training modules to accompany equipment orientation.
 - a. Lead Entity: NITC Technical Panel's Statewide Synchronous Video Work Group, in cooperation with commercial equipment manufacturer.
 - b. Timeframe: June-August, 2006 (Corresponding with equipment deployment)

c. Funding: To be determined.

G. Development of a cost and funding algorithm to allow shared use of the statewide backbone for interstate distance learning and videoconferencing.

Actions include:

1. Research models from other States' education networks.
 - a. Lead Entity: NITC Technical Panel's Statewide Synchronous Video Work Group, in conjunction with Network Nebraska (Collaborative Aggregation Partnership)
 - b. Timeframe: Ongoing
 - c. Funding: No funding required for this task.